

**Response Under 37 C.F.R. §1.116
Expedited Examining Procedure
Examining Group 3600**

REMARKS

Claim 1 has been amended to address the Examiner's objections and to include the limitations of cancelled claims 2 and 3.

Claim 1 now containing the limitations of original claims 2 and 3, the Examiner's rejection based upon Zhou et al. U.S. Patent No. 6,499,742 in view of Jude U.S. Patent No. 881,474 is now moot.

The Examiner has rejected original claims 1 to 6 under 35 U.S.C. § 103(a) as being unpatentable over Joyce et al. U.S. Patent No. 4,820,119 in view of Jude U.S. Patent No. 881,474.

The Examiner states:

Joyce discloses a stator (e.g. 60) having an abradable surface that is smooth (figure 2, e.g. inner surface of 62), a shaft having a first toothed axial section (e.g. see figure below), a second toothed axial section having few teeth (see figure below) and the abradable surface and toothed sections form labyrinth seal.

[Fig. 2 omitted.]

Joyce discloses the invention substantially as claimed above but fails to disclose the stator having swirl-reversal vanes. Jude teaches an apparatus having a shaft with a tooth and a stator (A) with swirl-reversal vanes upstream in the apparatus. It would have been obvious to one having ordinary skill in the art at the time of the invention to have the stator of Joyce to have swirl-reversal vanes that are tapered at ends or have an apex (e.g. an apex formed between one end and the curved end or an arcuate shaped with the top is pointed in the direction of rotation of the shaft, e.g. figures 2 and 4) as taught by Jude to provide an overflow weir for the escaping fluid (page 1, lines 81-82 of Jude).

Reconsideration is respectfully requested.

The Joyce patent relates to reducing steam leakage between turbine stages to improve efficiency. The Jude patent relates to recovery of lost energy due to leakage between turbine stages by means of small blades inserted between stages and directing the flow to the primary rotating blades.

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The Applicants' invention is directed to the solution of a problem associated with the rotor dynamics of high speed centrifugal compressors. As explained in Applicants' specification, labyrinth seals with strong gas swirl in the direction of rotation can introduce rotary instability.

The combined references do not suggest the subject matter of Applicants' claims nor would the combination proposed solve the problem of reducing swirl on the entry to a labyrinth seal.

The Examiner uses Joyce as his principal reference and has identified what he considers first and second tooth sections. The second toothed section is downstream of the first toothed section as indicated by flow arrow 24. However, what is identified as a second toothed section has no tooth. The rightmost projection from the spacer 16 lies flush against the solid base of the turbine blade 20. No flow takes place over the tip of this projection. This projection is not a tooth.

It appears that the Examiner is suggesting that the secondary guide vanes a' of Jude be inserted in the space between the turbine blades 26 and 20. But the flow is as indicated by arrow 24. Thus, if the secondary guide vanes a' of Jude are inserted at that location, they could at best be effecting swirl downstream of the labyrinth seal.

No other location is suggested by Jude. The secondary guide vanes a' of Jude are placed downstream of the weir b⁰. However, these swirl-reversal vanes do not channel flow to a toothed section but to the main turbine blades. See column 2, lines 99-104 ("the leaking fluid is utilized to drive the rotor where it presently joins the main stream".) There is no apparent reason suggested in either reference for placing swirl-reversal vanes upstream of a labyrinth seal in order to avoid rotor instability.

In view of the foregoing amendments and remarks, it is urged this case is now in condition for allowance.

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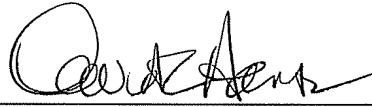
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It is requested the amendments be entered for purposes of appeal.

Respectfully submitted,

THE WEBB LAW FIRM

By



David C. Hanson, Reg. No. 23,024
Attorney for Applicants
436 Seventh Avenue
700 Koppers Building
Pittsburgh, PA 15219
Telephone: (412) 471-8815
Facsimile: (412) 471-4094
E-mail: webblaw@webblaw.com